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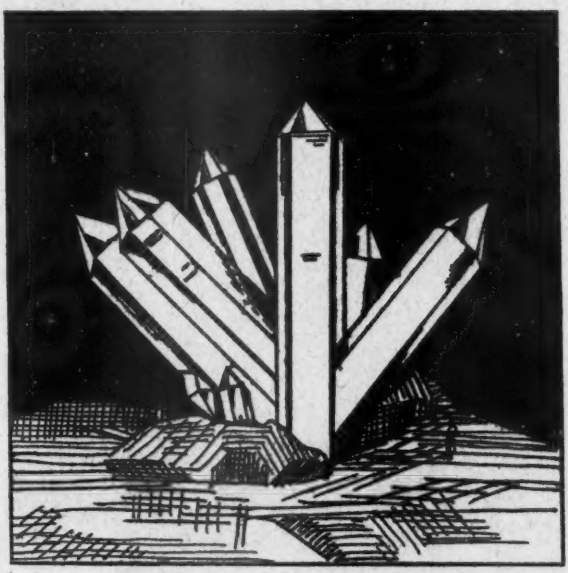
VOL. 10, NO. 2 WHOLE NO. 44

ROCKS AND MINERALS

A Magazine For Mineralogist, Geologist & Collector



OFFICIAL JOURNAL OF

THE ROCKS AND MINERALS ASSOCIATION

PUBLISHED MONTHLY FEBRUARY, 1935

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We have been very much pleased with the way in which the advanced price of the magazine has been received. No subscribers have been lost and many who read the announcement in the magazine, renewed at the new rate before they received notice of the expiration of their subscriptions. In return for this expression of friendly feeling and interest in the magazine itself, we shall endeavor to present even a better magazine. It has been our ambition from the very beginning to make ROCKS and MINERALS the best publication on mineralogical subjects that is or ever has been printed in the United States and this ambition is fired anew by this encouragement on the part of our subscribers.

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Among the advertising pages of this issue, our readers will find an announcement of a special offer. This covers 20 back numbers of the quarterly issue of ROCKS and MINERALS, at a reduced price, and a further offer of a free copy of our new bulletin "HOW TO COLLECT MINERALS."

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Please Co-operate

While the snow is on the ground and the temperature is low, it is a good time to think of spring outings. The annual national outings of the Rocks and Minerals Association is not so far off but that we can well afford to spend a little time in planning for them now. The editor would like very much to have some additional directors appointed in the various states and will be very glad to receive suggestions for their nomination. Also the editor would like to be advised at an early date of the locality each state chooses for its outing this year. Will someone or more in each of the various state groups send this information to ROCKS and MINERALS?

ROCKS and MINERALS

A MAGAZINE FOR MINERALOGIST, GEOLOGIST AND COLLECTOR

PUBLISHED MONTHLY — FOUNDED 1926

VOL. 10, NO. 2 — WHOLE NO. 44

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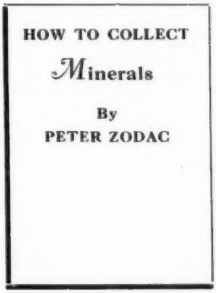

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Edited and Published by Peter Zodac

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The Official Journal of the Rocks and Minerals Association

FEBRUARY 1935

VOL. 10, No. 2

WHOLE No. 44

The Story of The Zinc Industry in The Saucon Valley

By RICHMOND E. MYERS, M.A.

In a small valley, just south of the Lehigh Mountains, and just over the Northampton County line, in Lehigh County, lie unworked the most productive zinc mines in Pennsylvania. The region in which these mines are located, the upper Saucon Valley, has contributed greatly to the wealth of the state from these mines, which in the latter part of the XIX century, yielded large quantities of high grade zinc ore, and which in the future may become an important factor, not only in the zinc production of Pennsylvania, but also of the nation as a whole.

The area in which this ore has been found in paying quantities is very small, and is made up of several mines in the immediate viciniy of Friedensville. From time to time prospecting has been carried on elsewhere in the valley, but without satisfactory results. Reports sprang up frequently of new zinc findings, which were never confirmed. Traces were found in some limestone drill cores from a place about one mile west of Friedensville, and also in the Hellertown Cave, but nothing to warrant any exploitation. The Friedensville deposits however, although confined to a very small area, are of a class which warrant a belief of their continuance to a considerable depth, and the ore is found there in abundance.

Yet these mines, which are five in number, lie unworked. They have become a part of that limbo of forgotten industrial efforts, such as is common among many of the early iron furnaces of our state. Today all that remains of the one time busy zinc mines, is four mine holes, filled with water, and the ruins of old buildings cluttered around them. Why should this be? What was the reason for abandoning a perfectly good mining business, and casting mines, far from being worked out, unto the scrap heap? We needs must turn to the history of the entire enterprise, to answer these questions fully.

Discovery and First Exploitation

Early in the last century a very strange mineral was noted in the surface soil of a farm in the Saucon Valley, owned by Jacob Uberroth. His farm lay about half a mile north of Friedensville, on what is now the Bethlehem Pike. Little attention was given to this mineral. It was considered to be of no account, for at that time the only economic mineral known to occur

in that region was iron, and that the strange mineral was no new form of iron ore had been ascertained by hauling a load of it to the Mary Ann Furnace in Berks County to be tested. This was in 1830. The test of course revealed no metal, for all the zinc was volatized, and escaped.

This settled matters. The stuff was proved useless, and for fifteen years nobody bothered himself about it. However in 1845, Andrew Wittman, after studying metallurgy, decided to see what could be done with the substance. He conducted a few experiments, and managed to obtain a few globules of zinc, but was unaware of their true nature.

However, this interested Uberroth. Reports had been circulating around the valley concerning the discoveries of gold in small quantities, all of which were later discredited, when the "gold" turned out to be nothing but pyrite (iron pyrite). However, the reports were circulating, and Uberroth, knowing nothing about gold in its natural state, began to imagine all kinds of things. It was on his property that most of this strange mineral had been found so far, and in a nearby cemetery (Friedensville Church yard), many of the graves had been and were being dug through large quantities of the unknown substance. He therefore decided to take some of the ore to Mr. Theodore Roepper, a mineralogist of some note, who lived in Bethlehem, and who later became the first professor of Mineralogy and Geology at Lehigh University.

The story is told that Mr. Roepper, who was also quite a botanist, was collecting specimens near Friedensville, and in pulling up a plant by the root, pulled up at the same time some of the zinc ore, which he at once recognized. The truth of the matter was however, that Uberroth took the ore to Mr. Roepper, in order to find out was it was. That he believed it was some form of gold is shown by the following incident, recorded by Mr. Samuel Wetherill Jr. in his memoirs concerning his father and the zinc business.

"Many of the graves in the old burying ground were dug in zinc ore, and I have no doubt that it was some of this ore which Jacob brought to Professor Roepper to have analyzed. The professor knew the ore at once for zinc ore, but didn't say so to Uberroth. He filled a rod of copper, fused the copper and ore together, and when he showed the result to Uberroth, Jake said, 'Is es gelt?' Roepper said it was not gold, it was zinc, and very good ore, worth considering."

This experiment was carried out in Lehman's Foundry at Bethlehem (1845).

Roepper, thinking that his observations warranted it, induced Mr. Robert Earp, a Philadelphia importer, to examine the deposit and obtain a lease on the Uberroth farm ($50.00). Earp, acting on this advice, mined ten tons of the ore, and in January of 1846 shipped it to Engand in one of his vessels, to see what could be done with it. The temperature of the English furnaces was not hot enough, so the report came back that the ore could not be used. Neither Mr. Roepper nor Mr. Earp were discouraged at this report, for zinc ore was zinc ore notwithstanding. However, nothing as yet had been done with zinc ore in the United States that amounted to very much. In 1838 brass had been produced in the U. S. arsenal at Washington, and the zinc used had been produced from a mixture of zincite ore mined at Franklyn Furnace and Sterling Hill in New Jersey. Ore from the Perkiomen mine in Montgomery County, N. J., was used in the manufacture of standard weights and measures, ordered by Congress. The processes involved, however, were very expensive, and not at all satisfactory, so both Mr. Earp and Mr. Roepper decided not to invest any capital towards mining the ore nor manufacturing its products.

Mr. Sam. Wetherill and The Pennsylvania Lehigh Zinc Co.

In 1850 the New Jersey Zinc Co. began to manufacture spelter at their Newark plant, using the ores from their New Jersey mines. This was the first commercial spelter made in the country. It was not a great success, but it did give Mr. Earp the idea that the New Jersey Zinc Company might be interested in taking over his lease on the Uberroth property, so he approached their Superintendent, Mr. Samuel Wetherill, to see what might be arranged.

Now Mr. Wetherill was not only the superintendent of the New Jersey Zinc Company; he was also a paint manufacturer who had quite a large plant and business in Philadelphia, and who was interested in zinc, only inasmuch as it would help the paint industry. He had been working for some years on a process whereby zinc oxide could be manufactured in quantities which he used instead of lead in the production of paint. He had just secured a patent on this process before Mr. Earp approached him regarding the Friedensville deposits.

What Mr. Earp told him brought him at once to the Saucon Valley, and his visit resulted in his taking over the lease of the mining rights from Mr. Earp almost on the spot. He returned to the offices of the company at Newark and consulted with the president of the concern. He offered to sell his patent to the directors at a good figure, and with it the rights recently purchased by him from Mr. Earp, but the directors refused to meet his figure, even threatening to sue him for his process, which they claimed was theirs inasmuch as he had perfeced it in their laboratories. They did offer him five thousand dollars for it, a figure far below his purchase price. When Mr. Wetherill was informed of this action, he sat down at his desk, wrote out his resignation from his position, "took his hat from the rack, and walked out of the office."

He went directly to a close friend of his, Mr. George Gilbert, and the two put their heads together. Mr. Wetherill knew that he had something well worth while developing, and Mr. Gilbert was soon convinced. The two friends furnished between them the necessary capital to mine the ore and manufacture the oxide, and in 1853 Mr. Wetherill moved to Bethlehem where he had purchased some property, and the erection of furnaces was begun at that place. The plant was erected on the south bank of the Lehigh River, in a section then known as Augusta, named after the owner of most of the farm land on that side of the river, Mr. Augustus Luckenbach, from whom the factory site was purchased. The buildings were soon put up, and the little group of houses that soon clustered around the plant came to be known as Wetherill, until the incorporation of the borough of South Bethlehem in 1871.

The location was well chosen. Only a few years after the erection of the plant, two railroads were laid close by, one on each side of the works. On the north passed the Delaware, Lehigh, Schuylkill and Susquehanna, the Lehigh Valley of today, and on the south soon followed the North Pennsylvania, now the Philadelphia and Reading. The foreknowledge of the fact that these two roads were to meet at Bethlehem, very likely had something to do with the selection of the site for the plant. It lay directly within the angle of the junction formed by the meeting of the two lines, one line leading New York, the other to Philadelphia.

Papers of incorporation were drawn up without delay, "for the purpose of mining zinc ore, and other ores found in connection therewith, and of the manufacturing zinc paint, metallic zinc, and other articles, all from the said ores, in the counties of Lehigh and Northampton, and of vending the same." The name given to the new company was the Pennsylvania and Lehigh Zinc Co., and its capital of $1,000,000 was divided into shares of $5.00 each. Under the terms of the agreement the company was to furnish the capital to operate and build the works, while Gilbert and Wetherill agreed to furnish the ore and labor, and to turn over the finished zinc oxide to the company for disposal, all of which was done. All of the directors and most of the stockholders were from Philadelphia.

The actual incorporation did not take place until 1855, but in the fall of 1853 the works were, although not entirely completed, in operation, and Mr. Wetherill was superintendent in charge.

The zinc oxide was produced from the ore by the furness or "tower" process of Mr. Wetheril, and collected by the bag process of Mr. Richard Jones. This operation was described by the late Matthew Henry as follows:

"The ore, pulverized and mixed with coal, is strongly heated in furnaces which are fully supplied with air, the metallic zinc which is thereby extracted in the form of vapor is instantly

oxidized, and the oxide of zinc thus formed being an exceedingly light powder is carried immediately from the furnaces by a strong artificial draft, together with large quantities of gases and such ashes, etc., as are light enough to float in a current of air. These ashes are taken first and separated and deposited with the coarser particles of zinc oxide in rooms provided for that purpose. A part of the pure zinc oxide is afterwards caught in chambers and finally the gases are all strained out by immense apparatus of flannel and muslin bags, to the inner surface of which the last and finest of the zinc oxide adheres, whence it is removed at proper intervals. The zinc oxide which is thus collected in the chambers and bags, is in the form of a very white fine and floculent powder, which is compressed by proper apparatus into much smaller bulk, and is then carefully packed into strong, tight, paper lined casks."

This manufacture of zinc oxide from the Friedensville mines was the second successful attempt made in the United States. In 1852 the New Jersey Zinc Co. had managed to perfect an inferior process after failing to secure that of Mr. Wetherill, and had begun the manufacture of the oxide on a commercial scale. Up to the time that the Pennsylvania Lehigh Company began operations, 2500 tons had been produced in New Jersey.

The first years of the new company were not easy years. It was to some extent handicapped by the unsound manner in which its operations were handled by a party of New York speculators, who knew nothing at all about the zinc business, and who looked for nothing but a speedy sale of the company's stock, at the highest possible prices. Not until 1857 was this done away with. In 1854 the Bethlehem plant was visited by a heavy hurricane, which unroofed the condensing building, damaging it considerably, so much in fact that it had to be rebuilt. To quote from the local newspaper: "The wind came down the valley with tremendous force, rolling up the sheet iron roof into a great ball, and hurling it 700 feet from the building."

Shorty after this disaster, the company was neary paralyzed by a fire which destroyed the two brick packing buildings, four stories high, and many of the surrounding sheds, but Mr. Wetherill was not discouraged, and rebuilding commenced at once. In spite of these handicaps, the plant was doing nicely when, by an act of the legislature the company was incorporated in 1855.

Another source of trouble at this time, which although nothing of a serious nature, was to say the least, an interesting or unique one. The ore from the mines was hauled over the mountain to the plant in Bethlehem, a distance of about four or five miles, by mule trains. The condition of the roads, although not impassable, made it advantageous to use the pack mules rather than wagons, and trains of twenty to thirty mules could be seen almost daily winding their way over the mountain and down into the town on the other side. These mules were driven by a rather rough set of men, unskilled laborers, imported from Philadelphia for that purpose. As their route became permanent, so also certain places along the route became permanent as convenient spots to stop and rest, tighten up the burdens of the mules, and inevitably, take a drink of something a bit stronger than water. There were three such stopping places, and it was not long before at each of them a bar was soon opened. The first at Colesville, the second at Seidersville, and the third half way down the mountain into Bethlehem. At the latter a small tavern was built and run by August Christ, which soon acquired a none too respectable reputation. Until the average mule team reached Bethlehem, its drivers were in a mood which easily led to trouble, and often resulted in street brawls in which at times considerable damage was done. To a certain degree these unpleasant occurences turned public opinion against the company, but by the adoption and enforcement of strict rules with the co-operation of the local authorities, the difficulty was in the end, overcome.

The infant zinc plant was a typical industrial institution of the fifties. Mr. Wetherill knew all his workmen personally. He called them by their first names, and believed in doing all he could to keep them happy and contented. It was his theory that a plant should be like one big family, and he

did all in his power to make his factory practical with his ideal.

He was in no sense a Robert Owen, for he never used his plant to carry out any theories developed by himself or anybody else, for the sake of experiment. He merely aimed at the happy medium of contentment and harmony between employer and employee, feeling that by so doing both would derive the greatest profits from their work. To quote from the local paper, "He was loved and honored by his workmen, and long will his name be remembered by the early settlers of the borough." It was his custom to give a yearly dinner to the men who worked in the plant. This was always held in one of the long back rooms, and Mr. Wetherill himself always presided as the genial host. To quote again from the same paper: "Champagne was plentiful, and all were jovial." Such was his policy in dealing with the men who toiled under him.

An interesting side activity of the plant in the fifties, was a one mile trotting course laid out in an adjacent tract of land by Mr. Wetherill and Mr. Gilbert, both ardent sportsmen and lovers of horses. During the summer hardly a noon hour passed that did not see one or both of these gentlemen willing to contend their favorite horse with any that might be offered. These races were of great interest to the workmen, and for several years horse racing was a regular feature of their daily programs. It was on this race track that the workers of the plant assembled in 1854 when the first locomotive to pass through Bethlehem put in its appearance, hauling behind it a few cars loaded with gravel. To quote from the local paper: "Great excitement prevailed. The Zinc Works saluted the iron monster with whistles, and crowds of the workmen flocked to the race track to see the wonder of the age."

As soon as the works were in good running order, attempts were made to produce spelter. Until 1859 Mr. Wetherill experimented with this end in view. He met with little success, involving much time and labor, and when he finally managed to perfect a process whereby spelter could be made, it was found to be utterly impracticable and the experiments were given up. In 1857 however, two young Germans, who had studied at the Freiberg Bergwerk Hochschule, were given permission by Mr. Wetherill to carry on experiments at the mines in spelter production. They were successful, but by the time they perfected their process, the administration of the company was passing through radical changes, and it would not, or perhaps could not, have anything to do with them.

The radical changes that took place in the administration were the outgrowth of several years, and were brought about in this manner. Towards the end of the fifties, the price of zinc oxide fell very low, and the Pennsylvania Company found much difficulty in disposing of its product. The warehouses in both New York and Philadelphia contained large supplies of unsold material, and they informed Mr. Wetherill and Mr. Gilbert that they wished to alter their contract to take less oxide than they had agreed to. Mr. Wetherill replied that he would arrange for a general consideration, and a meeting of the zinc company's directors was called at Mr. Wetherill's home in Bethlehem to decide the matter.

(To be Continued)

William C. McKinley, 730 B-4th Ave., Peoria, Ill., is collecting data on amber in the United States. He would appreciate notes on the mineral, also samples (as contributions for testing).

Muscovite Crystal-Cavity Filling at Mt. Mica, Maine

By WLLIAM C. McKINLEY

From a closer inspection of a specimen of pegmatitic material, from Mt. Mica, the author discovered a most interesting growth of muscovite with black tourmaline. Not being able to find references to such a phenomenon in literature on either Maine pegmatites, or other mineralogically associated subjects, the author thought it might be especially interesting to not only the amateur mineral collector, but for the trained geologist as well.

A description of the hand-specimen is given first: a mass of feldspar, with rhomb-like plates of muscovite protruding from one patch, and a prominent black tourmaline crude crystal, **outlined** by finely-foliated silver-hued muscovite—with montmorillianite patches among the whole mass itself. Of the accessory minerals, besides the ever-present feldspar, the muscovite and tourmaline, in this case, are the most abundant.

As to the cause of the pesence of this cavity-filling mineral, the following explanation is given as a personal opinion from deduction: due to the abundance of the muscovite, in this section (typical of the main mass from whence it was extracted), and upon the crystallization of the tourmaline from the magma, the extra amount of aluminum and potassium orthosilicate was converted into muscovite by the action of the development of the aforementioned tourmaline crystal—that is, as the tourmaline crystal assumed its symmetrical shape, the extra aluminum and potassium compound rapidly filled in the vacant space caused by the contraction, through crystallization, of the tourmaline; the muscovite, upon solidifying, formed a foliated vein-filling.

Courtesy of Maine Minerals

THE DOUGLASS COPPER MINE, BLUEHILL, MAINE

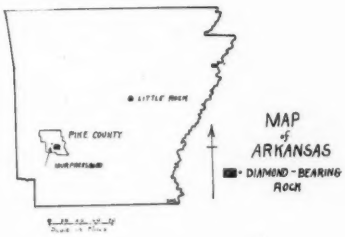
This mine produced over three million pounds of refined copper and was operated at late as 1923. The ore often assayed several dollars per ton in gold and silver. During the world war the mine was a producer of sulphur and sulphuric acid from the sulphide ore.

Diamond Finds In The United States

By EUGENE W. BLANK, *Scientific Editor "Rocks and Minerals"*
Colgate-Palmolive-Peet Company, Jersey City, N. J.

PART V.

DIAMONDS IN ARKANSAS—*Continued*



Mining Operations

Most of the mining has been done in shallow open cuts and the diamonds recovered by washing the diamond-bearing material with water. Much of the decomposed peridotite is already soft enough to be washed for the recovery of the diamonds without first undergoing a preliminary weathering or crushing. Most of the mining has been done by means of hand and scrapers. A small amount of hydraulic mining has been carried on. In the latter case the water carried the disintegrated diamond-bearing material through a sluice trough from which the concentrates were removed by hand and then jigged after which the concentrates were carefully examined for their diamond content.

Most of the material is treated in a washing pan similar to those in use in the South African diamond fields. The pans are circular with flat bottoms; at the center is a vertical revolving shaft to which toothed, radiating arms are attached. These teeth serve to stir up the diamond bearing material that is introduced into the pan. During the stirring the diamonds and associated heavy minerals tend to settle to the bottom of the pan. The concentrates thus obtained are jigged and examined for diamonds or they are washed by water over a grease covered table which is shaken by an eccentric. The diamonds are held by the grease while the rest of the minerals are washed off the table. The grease with its diamond content is removed from time to time and the diamonds freed by boiling with strong lye.

There are a number of minerals that concentrate along with the diamonds. These include, in order of decreasing abundance, hematite, limonite, barite, colorless quartz, amethyst quartz, magnetite, pyrope, almandite, schorlormite (or melanite), chromite, pyrite, diopside, and epidote. Amethyst quartz of gem quality is occasionally found associated with the diamonds. Dense chalcedonic novaculite is also found and some has been cut for use as jewelry.

SUMMARY OF AUTHENTIC DIAMOND FINDS IN THE UNITED STATES

State	Peridotite Deposits	Diamonds Found	Remarks
Alabama		Shelby County	One stone of 4¼ carats; also one stone from Lee County.
Arizona		Meteor Crater	Microscopic stones in meteoric iron.
Arkansas	Pike County	In peridotite	Commercial deposits
California		Butte, Amador, El Dorado, Nevada and Plumas County	Found in gold placer and platinum mines.
Colorado	Near Querida, Custer County (57) Also in Boulder County.		
Georgia	(58)	Reported from 16 Counties	Found in gold placers
Idaho		Reported from Adams and Owyhee Counties	Found in gold placers
Illinois	Southern Illinois (59)		Stray stones in glacial drift
Indiana		Twenty to thirty stones	Stray stones in glacial drift
Kansas	Riley County (60)		
Kentucky	Elliott County		
Michigan	Marquette County	At Dowagiac	One stone of 11 carats
New Mexico	West and North of Gallup	Santa Fe?	One stone reported from gravels near Santa Fe?

57 Deposit described in "Colorado Society Proceedings," Vol. 2, 1885-87. The peridotite forms a small oblong outcrop in the Archean on the north bank of Cottonwood Gulch, above the Mountain Boy mine in Custer County. Brown hornblende and hypersthene are developed in about equal prominence beside the olivine.

58 "Asbestos, Talc and Soapstone Deposits of Georgia," State Geological Survey Bulletin No. 29. Discusses the occurrence of peridotites in Georgia.

59 Carroll, "Igneous Rocks and Associated Mineral Deposits of Southeastern Illinois," Rocks and Minerals," Vol. 6, 92 (1931).

60 Knight and Landes, "Kansas Laccoliths," Jour. Geology XL, 12 (1932).

New York	Several localities (61) Syracuse; near Peekskill.	Syracuse	Quite small stone
North Carolina		Western Piedmont section	Twelve specimens
Ohio		Milford, near Cincinnati also Cleveland	Finds open to question?
Oregon		Southwestern portion of state	In gold placers
Rhode Island	Cumberland		
Texas		Montgomery County	2¼ carats, badly flawed
South Carolina	Oconu County		
Virginia		Manchester	Largest diamond found in the U. S., 23¾ carats
Washington		Northeastern portion of state	Microscopic diamonds in black sands
West Virginia	Pendleton County		
Wisconsin			Five or six stones in glacial drift

Chief Collections of American Diamonds[62]

According to Dr. Charles Palache, Curator of the Harvard University Mineralogical Museum the principal United States diamond in the collection under his care is a yellow hexoctahedron of almost ten carats, which was purchased from the Kunz collection. This is a very unusual stone. There were also purchased from the Kunz collection two light, irregular, colorless fragments 2.35 and 10.53 carats respectively and, in addition to these, a parcel of thirty-seven stones weighing together 17.78 carats. These are of various colors ranging from colorless to brown and exhibiting a wide variety of crystal form. These stones were selected by Dr. Palache from a large parcel of Arkansas diamonds in the possession of Tiffany and Company, and they represent the last diamonds to be mined at the Pike County Mine. All of these stones are from Murfreesboro, Arkansas.

61 Newland, "An Occurrence of Peridotite near Ogdensburg, New York," New York State Museum Bulletin No. 286, pp. 113-17. Contains a bibliography of Peridotite occurrences.

62 The facts under this heading were communicated to the writer by the respective parties mentioned.

According to Dr. W. W. Bradley, State Mineralogist of California, there are several California diamonds on display in the Ferry Building, San Francisco. Probably the best are No. 18251, a natural, uncut crystal, No. 20014, a cut stone; both from Cherokee Flat, Butte County. They were found by N. A. Harris in 1868. Mrs. Harris donated the uncut stone in 1911 and willed the cut stone in 1927. They are clear and weigh about one carat each. Other stones in the collection are:

No. 4033 rough from Spring Valley Hydraulic Mine Cherokee Flat, Butte County, donated by F. G. Williams.

No. 9838 rough from Volcano, Amador County, which has been in the collection here since 1888.

No. 20283—5 crystals in rough two miles south of Murfreesboro, Pike County, Arkansas, donated in 1932 by W. N. Bemis. Also specimen No. 4377 is a diamond probably from Africa, which was used in salting the ground of the well-known diamond swindle.

Dr. Farrington of the Field Museum of Natural History, Chicago reports: "The only diamonds of American origin in the Museum collections are three small stones from the Ozark Diamond Mine near Murfreesboro, Arkansas which were presented by Howard A. Millar. These are small, bright crystals. One, canary color, weighs 0.275 carats, one, brown, weighs 0.27 carats and one, white, weighs 0.20 carats. In addition there is a model of the Dewey diamond, weight 23½ carats, found at Manchester, Virginia in 1855 and models of two smaller stones found in Dysortville, North Carolina.

Dr. W. F. Foshag, Curator of Mineralogy, United States National Museum, Washington, D. C., reports that the collections under his care contain the following American diamond specimens:

"32 crystals from Arkansas including a fine golden yellow one of 18 carats, and a brown one of 12 carats.

1 from California, about 1½ carats.

1 from Cabin Creek, Montpelier, Ky. 0.776 carats.

1 from Brown County, Indiana. 1.7 carats.

1 from Rutherford County, N. C. 0.14 carats.

1 from Huntsville, Texas. 1.7 carats.

This museum has a diamond reported to have come from Idaho but the authenticity of the locality is doubtful."

Dr. Herbert P. Whitlock, Curator of Minerals and Gems, The American Museum of Natural History, New York City, reports: "In our Gem Collection we have the following specimens all collected by the late Dr. George F. Kunz.

1. Near Birmingham, Alabama, weight 4.37 carats.

2. Lee Co. Alabama, weight 4.61 carats.

3. Near Murfreesboro, Arkansas, small crystal sawed in two, weight 2.5 carats. Also 10 rough crystals aggregate weight 6.93 carats.

4. Volcano, Amador, Co. California, 2 small crystals.

5. Near Eagle, Waukesha Co., Wisconsin, large crystal, weight 15.7 carats.

6. 2½ miles S. W. of Oregon, Dana Co. Wisconsin, Weight 3.98 carats."

While Mr. Blank practically concludes in this issue his interesting account of "Diamond Finds in the United States," he has sent us an appendix, received too late for publication, which will appear in the March number of ROCKS and MINERALS. In this he describes briefly some of the diamonds which have been found in Indiana with excellent photographs that will be reproduced with this last installment.

—The Editor.

Further Explorations on Mt. Antero, Colorado

By EDWIN OVER, Jr.

The account of my first experiences on Mt. Antero was published in the December 1928 issue of ROCKS and MINERALS.[1] Since then I have done much work there and have learned something of the history of this, the highest of American mineral localities.

A John Wanamaker of Denver first found aquamarine there sometime during the '70's and worked the locality during the summer seasons for many years thereafter. In the years that have elapsed, numerous collectors have prospected there, generally without success. The only one I know of who got results was the late J. D. Endicott of Canon City, who found some excellent large bertrandite, many years ago.

Besides the limited work done in 1928, I was there for one week in '31, for 10 weeks in '32 and six weeks in 1933. The work in '28 and '31 gave me a knowledge of the area which was to prove invaluable during the later work. The efforts of '33 yielded no aquamarines of importance, but I did find a valuable pocket which contained several excellent specimens of large single phenacite crystals on highly etched quartz crystals, and several hundred loose phenacites in sizes from ¼" to ¾" in diameter. Many of these crystals were etched and all had very narrow prisms.

Mt. Antero is a massive uplift which lies on the west side of the valley of the Upper Arkansas River and about sixteen miles southwest of Buena Vista, Colorado. The main peak is 14,245 feet in elevation and the mineralized area is all above timberline. Included in the area of mineralization is White Mt., a 14,000 foot east-west ridge which lies about one-half mile south of the main east-west ridge of Mt. Antero. Timberline is at about 12,000 feet elevation on the south slopes and probably 500 feet lower on the north slopes. Thunderstorms are frequent during the summer months and hail falls more plentifully than rain. The amount of workable territory is greatly limited by large areas of coarse slide rock, which not only obscures the solid formation, but also adds an element of risk to any work. The two mountains are monzonite

1 Over, Edwin, Jr. *The Mt. Antero Aquamarine Locality.* ROCKS *and* MINERALS, Dec., 1928, Vol. 3, No. 4, p. 110.

Calico Mountain—just west of Mt. Antero. The foreground is the top of a ridge at an elevation of 13,900 feet

granite which is occasionally transversed by belts of quartz monzonite. The pegmatites which contain the crystal pockets all occur in the granite. Both on Antero and White Mountains there are a few pegmatites which can be traced for a hundred yards or so, on the surface, but the common tendency is to small pegmatites, which begin as narrow seams, swell to a width of two to four feet and then narrow down and disappear within a distance of twenty or thirty feet. It was in such a small pegmatite that the aquamarine pocket occurred which made the 1932 season so successful.

The commonest pocket mineral is smoky quartz, then comes microcline, muscovite, aquamarine, phenacite, fluorite, garnet and bertrandite. Occasionally there are limonite pseudomorphs after pyrite cubes. In many quartz-rich massive pegmatites which do not make pockets, complex twins of ilmeno-rutile and a little monazite occurs frozen into the quartz or microcline.

Four of the '32 finds are of unusual interest and the aquamarine pocket had the greatest value. At one place were found many small pockets containing inter-locking quartz crystals, ranging in color from clear to deep smoky. Upon these quartzes were implanted many small single phenacites, many twinned phenacites ¼ inch or less in length, also etched garnets of a translucent brownish-red, and crystals of muscovite. There was only a trace of aquamarine here.

In another part of the area, on the side of a ridge and at an altitude of 13,000 feet, was found a pocket that yielded at least 1000 pounds of fine smoky quartz crystals, the largest of which weighed fifty pounds. The quartz crystals contained large gemmy areas and were well formed for crystals of such size. Highly etched crystals of microcline were common, and rounded and flattened octahedrons of fluorite, showing spots and sheets of deep violet or carmine color occurred loose among the quartzes. A few minute phenacite crystals were implanted upon the quartz crystals and three or four small aquamarines were found imbedded in the bottoms of the quartz crystals.

At another place there were found numerous single phenacites up to one inch in length and a few small bertrandites or phenacites implanted upon quartz crystals or highly etched aquamarine. Here was found what was undoubtedly the finest twinned phenacite ever obtained at this locality, it was about ¾ x ¼ inches, and is now in the Harvard University Collection.

The aquamarine pocket, which was the greatest achievement of all my work at Mt. Antero, was found just below the crest of a 14,000 foot ridge. The pocket was about 5 feet in length and the greatest width was about two feet. At the time the contents of the

The northern exposure of the east end of White Mountain, taken from the east ridge of Mt. Antero, just below timberline

pocket was taken out, late in August, there was still ice in the back part of the pocket. Except for a few crystals that were lying flat on the walls, all aquamarines had been broken off, and the largest crystals were in two or three pieces. The pieces fitted together very closely and the results of the repairing were most satisfactory. The aquamarines had grown from the roof of the pocket and had been surrounded by small quartz and muscovite crystals. The freezing and thawing of ground water was undoubtedly responsible for the breaking of the aquamarines. The bulk of the quartz which occurred there grew from the bottom of the pocket as did also the large microclines. The quartz crystals ranged in weight up to about eight pounds and the most interesting feature of the quartz was the unusually deep color, which was so rich that fractured surfaces resembled black obsidian. Several quartz-microcline groups were excellent and there were two large baveno twins of white microcline that weighed twenty-two and eleven pounds, respectively. No phenacite or bertrandite were evident. Some of the larger aquamarines had narrow channels about ⅛ inch deep etched into the prisms. The total weight of the aquamarines was about seven pounds and there were ninety odd crystals of various sizes. Some of the large crystals were partly opaque and without terminations. The three best crystals, all of which had been broken, and the two or three pieces of each crystal easily and closely fitted together, were of the following sizes: 7 1/16" x 1⅛", 7¼" x 1 1/16," and 6¾" x 1⅛." The upper two-thirds of their length was of gemmy quality and these and the others were of a deep aquamarine color. The 7 1/16" x 1⅛" crystal was doubly terminated and is surely one of the finest aquamarines ever found in this country. All of the aquamarines from this pocket were purchased by Dr. Palache for the Harvard University Collection.

While working this locality, I slept in a cabin at 9200 feet elevation and hiked to and from the "diggings" each day. However, a timberline camp is to be recommended to anyone who is ambitious to spend a season at Mt. Antero. The view is also recommended and is often a great compensation for a days' work which is barren of results.

The Amateur Lapidary

Conducted by J. H. HOWARD*

504 Crescent Ave., Greenville, S. C.

Amateur and professional lapidaries are cordially invited to submit contributions and so make this department of interest to all.

*Author of—*The Working of Semi-Precious Stones.* A practical guide-book written in non-technical language for those who desire to cut and polish semi-precious stones.

Sulphur Diamond Jewelry

In the anthracite coal mines of Pennsylvania, iron pyrite is commonly found in drusy form. When it also occurs in minutely thin veins, the pyrite is cut out into various shapes—oval, circular, rectangular—and without any polishing or other preparations, is mounted into rings, tiepins, watch fobs and other articles of jewelry or ornaments. This style of jewelry is very popular with the hard coal miners and the pyrite is commonly called by them, "sulphur diamonds." When first mounted, the pyrite is most attractive and sparkling, but after a few months wear it becomes dull and lifeless.

Club and Society Notes

Northern California Mineral Society

On Jan. 16, 1935, a group of mineral collectors in San Francisco, Calif., met at the home of E. W. Shanks, 354 Spruce St., and organized the Northern California Mineral Society. All who attended were prominent collectors and mineralogists and were most enthusiastic about the new club. Thus another mineral club in California has been launched and offers promise of growing into a lively organization. Mr. Shanks was honored by being elected Secretary-Treasurer.

The Society will meet on the first Wednesday evening of every month at the California State Bureau of Mines, Ferry Building, San Francisco.

Michigan Mineralogical Society

Twenty-six mineral enthusiasts met Saturday, Jan. 12, in Detroit and organized the Michigan Mineralogical Society. It was agreed by the committee who arranged the meeting that the organization be as simple as possible—no constitution, no by-laws, no dues, and with only one officer, a secretary, whose sole duty shall be to take care of the correspondence and act as contact man, with power to call upon any or all of the members for whatever assistance he may need.

All members present at the initial meeting were urged and advised to become members of the Rocks and Minerals Association.

A. F. Combs, 15101 Penrod Avenue, Detroit, Mich is the Secretary.

Bibliographical Notes

Report of the State Geologist on the Mineral Industries of Vermont. 1933-1934. By Elbridge C. Jacobs, State Geologist, Burlington, Vt. 36 pages.

"Geologic History At a Glance," by Richards, Stanford University Press, Stanford University, California, $1.50. This new work is composed of very excellent maps and charts, together with written data, on the subject of stratigraphical geology, and is an INNOVATION in its field! Not only can the student derive the clearest of concepts from its contents, but the layman, also, may now see "before his eyes" the meaning and importance of stratigraphy in both its petrological and paleontological terms!

WM. C. McKINLEY.

MINERALOGY QUIZ

(Answers on Page 32)

1. What is the chief ore of iron? of zinc? of beryllium?
2. Name an important district for crystallized specimens of each in the United States.
3. Name an important foreign district for crystallized specimens of each.
4. Do these ores furnish attractive specimens for a cabinet?
5. Can any of these ores be used as gems?

"HOW TO COLLECT MINERALS"

By PETER ZODAC—Price $1.00

Reviewed by H. Alban Anderson

"How to Collect Minerals" is an 80 page pamphlet written by Mr. Peter Zodac and issued as "Bulletin No. 2" of ROCKS and MINERALS, the magazine of which Mr. Zodac is the Editor.

While Mr. Zodac in his preface states that "Although this bulletin is written especially for the young collector, it contains many items that will be of value and interest to those of mature years," he has been altogether too modest. He should have said quite boldly and fearlessly, that "Although this bulletin is written for those of any age who wish to know how to go about collecting minerals, nevertheless it contains many items that will be of interest and value to those of seasoned experience." Nor would that have been an overstatement. For in the preparation of his pamphlet, Mr. Zodac had behind him the rich experience of fifteen years as a mining engineer, prospector, mineral dealer, and collector, and the thousands of practical questions asked him by eager, enthusiastic collectors during his ten years as editor of a mineralogical magazine. Naturally little, if anything, in the technique of collecting and caring for specimens has been omitted.

It is an eminently practical publication. The text is simple, direct and always informative. At times the author draws upon incidents in his own life to illustrate a point he wishes to make, and his fascination for minerals is indicated by the quotation from Ruskin in the preface.

The author has divided his text into parts, rather than chapters. The first three are preliminary and are entitled, "How to Begin," "Hints on Collecting" and "What to Collect."

Part 4 takes the reader into the field, explaining the equipment needed, where to look, and what may be possible localities for minerals and Part 5 covers the cleaning, trimming, preserving, display and identification of the specimens brought home.

At this point the author, assuming you are now a reasonably fair mineralogist, with information and accumulated data as to visited localities, which you would like to impart to others, discusses in Part 6 how a "Mineral Article" should be prepared, and follows this up in Part 7 with how to form a club, even giving the reader a proposed form of by-laws by which the club may be governed.

The last pages are devoted to "Collectors and Collecting" and an interesting bibliography of mineralogical books and articles which have appeared in the ROCKS and MINERALS MAGAZINE.

The book can well be in the library of every collector and amateur mineralogist. If the possessor of the pamphlet does nothing more than follow, conscientiously, the instructions contained in the few pages beginning with the subtitle "Diaries" and running to the end of Part 1, he will form orderly habits in collecting, acquire informative data and add greatly to the enjoyment of his collection, all of which should well be worth the pamphlet's price.

Personal Greetings

We are always pleased to meet our friends when they are traveling this way. Among those who called on us recently were:

Mr. and Mrs. Allison Albee, of Rye, N. Y.

Miss Grace Carhart, Hunter College, New York City.

Mr. and Mrs. Henry Thurston of Montrose, N. Y.

Mr. and Mrs. Emmet Doherty, of the Stone Studio, Peekskill, N. Y.

Reader's Section

Editor "R & M":

It is with pleasure that I learn the subscription price of ROCKS and MINERALS has been increased. It has long been worth more than the price asked.

J. W. BRADLEY.

Los Angeles, Calif.

Editor "R. & M."

I recently purchased a copy of Howard's Monograph "The Working of Semi-Precious Stones." I knew nothing about the subject but had a desire to learn. When the monograph arrived, I was greatly disappointed—it seemed so small—but after reading, I became delighted with it as its text was exceptionally clear. Now I am anxious to get the equipment together and start working. PETER K. NELSON.

Blanchardville, Wisc.

Editor "R & M":

I have just completed bringing up-to-date (12/31/34) the records of advertising results. You may be interested to know that while two other magazines show a slightly lower cost per reply received, ROCKS and MINERALS shows the lowest cost per dollar of resulting sales. With but a few breaks this record covers advertising in ROCKS and MINERALS from the first issue to that of December, 1934, and includes therefore both "lean and fat" years in our economic history. These records indicate that ROCKS and MINERALS MAGAZINE is the medium for the "long pull". Best wishes for 1935.

1/3/35 THE GEM SHOP

Helena, Mont. A. J. Harstad, Prop.

Acknowledgments

We wish to acknowledge receipt and express our sincere thanks for specimens and other donations recently sent us by some of our subscribers.

John Seaman, Pittsburgh, Penn., a large assortment of some interesting Colorado minerals that he had personally collected.

Alfred E. Hammer, Branford, Conn., Cleaveland's Mineralogy. This very interesting book was issued in 1825 and is now unobtainable. Fortunate indeed is the collector who can boast of this book in his mineralogical library.

George L. English, an autographed copy of his new book — "Getting Acquainted with Minerals." This book is most fascinating and is meeting with wide sales.

Jorge Morlon, Havana, Cuba, two choice marble specimens from Cuba.

Ernest Weidhaas, Pelham, N. Y., 5 interesting minerals from an old limestone quarry at Ossining, N. Y., collected years ago.

James Watson, Bartlesville, Okla., 3 fine golden calcite crystals from Oklahoma.

C. L. C. Bourne, Georgetown, British Guiana, 2 mint copies of a 4c and a $1.00 stamp of British Guiana that were recently issued. The view on the $1.00 stamp—Avenue in Botanic Gardens—is from a photograph taken by Mr. Bourne.

MINERALOGY QUIZ—Answers

(Questions on Page 30)

1. Hematite. Sphalerite. Beryl.
2. Lake Superior District. Joplin, Mo. District. Black Hills, S. D.
3. Cumberland, England. Cumberland, England. Minas Geraes, Brazil.
4. Yes, especially if crystallized.
5. Yes, each one often occurs in gemmy form.

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FINE GEODES. ½ TO 4 LBS.—50c PER POUND, postage extra. J. G. Wainwright, 216 Franklin St., Waukegan, Ill.

CALAMINE, A HYDRATED ZINC SILICATE from Granby, No. Crystallized piece about 2" x 2½", 50c postpaid. Tom Tarr, 101 S. Chickasaw, Barthlesville, Okla.

PETRIFIED WOOD—FIVE CABINET SPECImens, from five different states for one dollar postpaid. F. C. McIntosh, 841 Greenway Drive, Beverly Hills, California.

SPECIMENS OF THE JOPLIN, MO.—PICHER, Okla., area. Send for free catalog with picture of various formations. Boodles Mineral Specimens, Galena, Kansas.

P. S.—Saw your Ad. in Rocks and Minerals

MINERALS

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MISCELLANEOUS

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MISCELLANEOUS

ROCK AND MINERAL UTILITY MAGNIFIER, 1¾" diameter wide field lens, sturdy construction, adjustable universal ball and socket joints, hinged wood case. $2.00. Other magnifiers 60 cents up. Complete line of Bausch and Lomb magnifiers. Pickup and Brown, Inc., 580 - 5th Ave., New York City.

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